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THE WAR AND THE WEATHER

BY W. W. CAMPBELL

One of the most interesting departments in the science of psychology relates to the mental processes of people in general as to the weather. "Unusual weather" occurs almost every year and the explanation is sought after. The idea is widely prevalent that the great war affects the weather mightily. The spring of 1917 was belated and cold in many countries of the northern hemisphere. "Don't you think that was caused by the war?" The month of July, 1917, was very hot. "Was not the war in Europe in some way responsible?" Soldiers in the Civil War have not forgotten that many of the battle fields were drenched with rain, and this they generally attributed to the artillery bombardments.

Several factors are operating to produce the mental point of view described. People forget that unusual weather occurs almost every year in many parts of the world whether the years are years of peace or years of war. If snow had fallen in London in July, 1917, its cause would have been attributed to the war; the people forget that it snowed in London in July, 1888. If the thermometer in London had got up to 100° Fahrenheit in August, 1917, the people would have suffered frightfully and the war would have been charged with the responsibility; almost nobody in London would have remembered that the thermometer got up to 100° F. in 1911.

The Civil War veterans will readily recall that their camps were deluged with rain a great many times when battles had not been fought. Governments and generals who are responsible for the outcome of the battles try to have them begin in good weather. Now, the weather consists of alternate calm and storm, and if the battles are begun in good weather their chances for ending in bad weather are excellent.

In the same way the psychologist could make a long list of curious views as to weather causes which have no foundation in theory or fact.

The director of the French Meteorological Service, Monsieur Angot, has recently published a valuable paper treating of the weather in France during the three war years, 1914-17, and he has come to the conclusion, which all genuine students of the subject would anticipate, that there was no apparent connection between the war and the weather. He calls attention to several simple facts.

There was more rainfall in 1909 in France than in 1915, and more rainfall in 1910 than in 1916. There was relatively little fighting in France during the last months of 1915, especially in December, 1915; yet December, 1915, was an unprecedented wet month. The great battle for Verdun began on February 21, 1916; more rain fell in France between the 10th and 20th of February than in the ten-day period beginning with the 20th.

A study of the number of days on which rain fell leads to the same conclusion. There were more rainy days in 1910 than in 1916, and more rainy days in 1912 and in 1913 than in 1915; in fact, the number of rainy days in France in 1915 was eleven below the average.

Similarly there has been nothing exceptional in the local distribution of rainfall in France during the three years. The number of rainy days and the quantity of rainfall have not been greater along the fighting line than in the other parts of France.

A strong bit of evidence is afforded by the weather in the spring of 1917. The artillery bombardments were on a vastly greater scale during those months than during any other months of the war. Now, unusually dry and clear weather existed in France in those months; in fact, the weather was sometimes spoken of as the spring drought of 1917.

M. Angot at the same time approached the subject from the theoretical side, and concluded that the energy released by the artillery explosions was wholly insufficient to increase the quantity of rainfall appreciably, even if all the effects were operative in the immediate vicinity of the firing line. Angot's paper is published in the *Journal of the French Academy of Agriculture* for May, 1917, and I am indebted to "*Nature*," August 9, 1917, for the review of his work.

The principal reason for the widely prevailing view that human activities exert a great influence upon the weather lies in the fact that we do not appreciate—we are unable to appreciate—the scale upon which nature works. The most comprehensive and sustained works of man, even the works of entire nations engaged in cooperative efforts, are almost infinitesimal in comparison with the forces of nature.

With entirely negligible exceptions the energy which drives our ships and trains and does the work of the world came from or is now coming from the Sun. We have drawn upon no other source

of power. The solar energy is coming to the Earth at a prodigious rate. For example, a 250-acre ranch under the clear skies of New Mexico or Arizona during the four or five midday hours of a June or July day is receiving energy from the Sun at the rate of a million horse power. The solar energy coming to the whole Earth every day—in a single day—is sufficient to drive all of the ships, trains, street-cars, factory and farm machinery, to light our streets and houses, to cook our meals and to heat our buildings for at least 500 years, and possibly 1000 years! Most of this energy radiates from the Earth out into space unused, but some of it evaporates the surface water of the Earth, another part produces the winds, a little of the energy is consumed in growing our food, and so on.

We do not and we cannot comprehend the energy represented by the winds of the Earth, but let us, for example, consider the trade wind that blows southeasterly thru the Santa Clara Valley of California on the afternoon of a summer day. A windmill a few feet above the floor of the valley reveals the wind's power. The revolving fans of a million windmills could be placed in a vertical plane cutting east and west across the valley from Los Gatos to Mt. Hamilton, extending from the valley floor to a level line one mile above the floor, if we had means of supporting them, and those million would absorb only a part of the energy of the passing air. Yet, what is a gentle trade breeze in the Santa Clara Valley extending only to an altitude of a mile in comparison with the great trade winds of the seas? A good breeze blowing thru the Santa Clara Valley during a summer afternoon undoubtedly represents a vastly greater disturbance in the terrestrial atmosphere than the total of all the disturbances produced by all the artillery bombardments on all the battle lines of Europe in a year!

What is man that we should be mindful of him in comparison with the cosmos?